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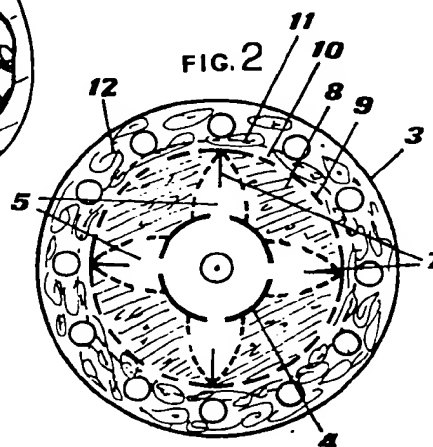
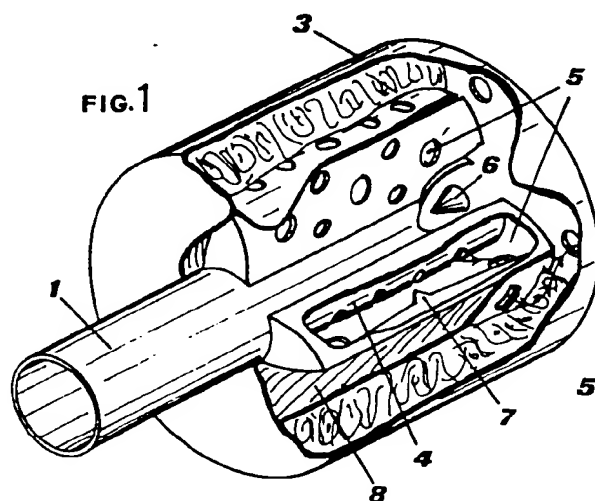
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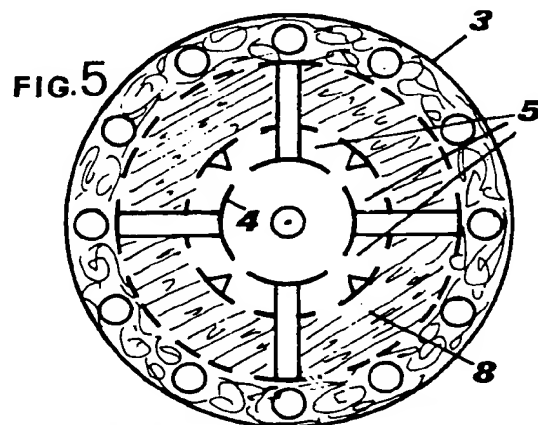
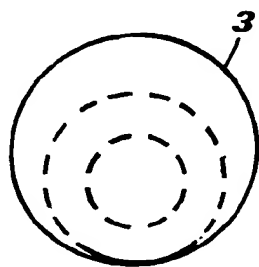
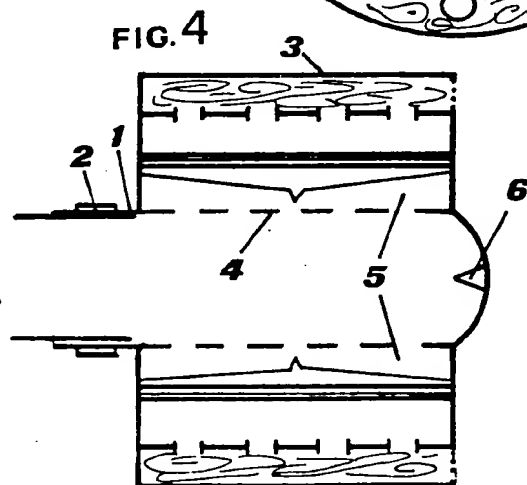
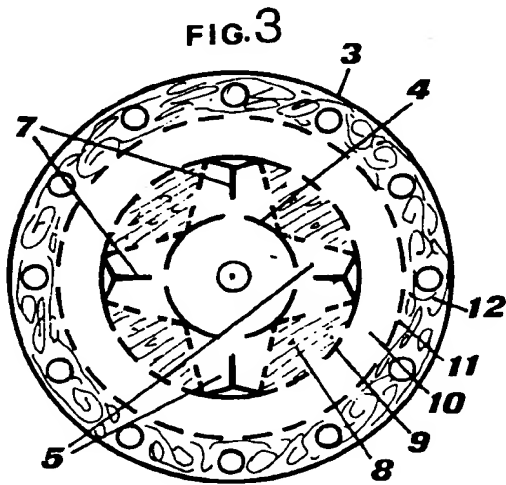
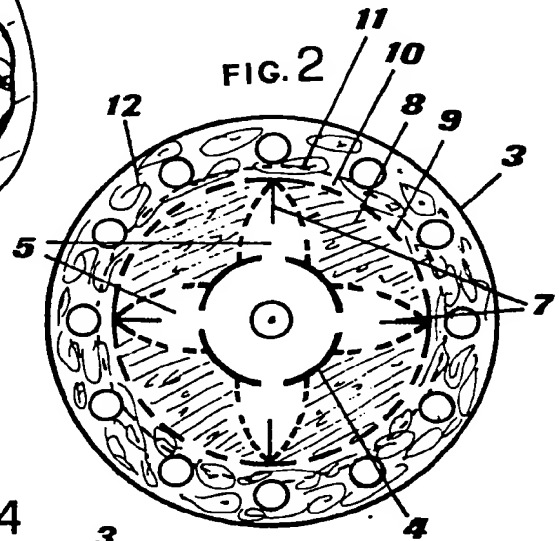
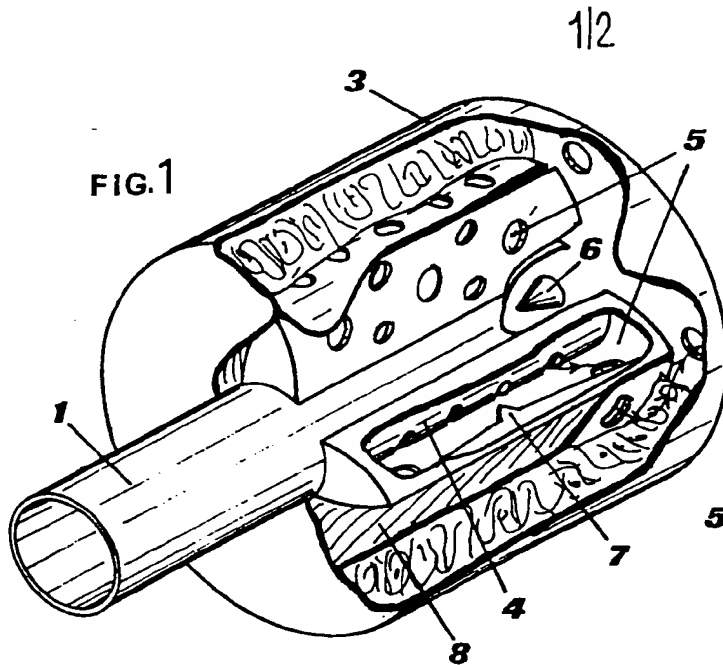
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(54) Anti-pollution silencer for  
Internal combustion engines

(57) Turbulence chambers 5 are provided which contain thin plates provided with points 7 and optionally with slim metallic elements enclosing graphite or ferrite cores. The latter heated to high temperatures by the combustion gases coming from the engine, so as to form sources of oxidation for combustible components of the exhaust gases.



GB 2 030 221 A



## SPECIFICATION

### Anti-pollution silencer

5 This invention concerns an anti-pollution silencer suited to be applied to any internal combustion engine and to be connected to an existing silencer or to replace the same, with the purpose of obtaining a perfect depuration of the exhaust gases before the  
10 latter are dispersed in the exterior, and to oxidize completely said gases with no need of chemical or artificial treatments.

As is known, the silencers actually used do not comply with these requirements. This inconvenience  
15 represents the main cause of the ambient pollution. Besides, the actual silencers are costly to be produced and are often exposed to remarkable wear.

It is therefore a task of this invention to realize a silencer of a new type, which can assure a perfect  
20 depuration of the escapes, being at the same time simple both for its manufacture and its installation, and suited to be applied to internal combustion engines of any type.

The invention reaches this aim by realizing a silencer thus composed:

- 25 – a jacket of any form applied to an escape tube through fixing bands;
- filters of a metallic material, and eventually of the catalytic type, made of glass wool or the like;
- 30 – turbulence chambers lodged inside said jacket and eventually containing ferrite or graphite cores, presenting thin plates provided with points or thin metallic elements.

According to the overall concept of the invention,  
35 inside said turbulence chambers there are disposed points and thin metallic elements, lodged eventually into graphite or ferrite cores, which, under the impact of the bouncing molecules of unburned gases arriving from the engine, and therefore accelerated due to the small dimensions of the turbulence  
40 chambers, can be heated up to elevated temperatures, thus becoming sources of oxidation suited to obtain a perfect depuration of the carbonaceous substances carried by the exhaust gases.

45 According to the invention, there takes place an important physico-chemical process into said turbulence chambers. The unburned gases coming from the exhaust pipe are submitted, before they go across the filters, to a rubbing action against the  
50 walls. This will raise their temperature, while said thin plates, owing to their thinness, will be overheated and will contribute to oxidize completely the carbonaceous particles. The latter will then be filtered and expelled through a discharge outlet having  
55 a greater section than the customary ones.

Thanks to their thermal capacity, the ferrite and graphite elements foreseen in the invention serve as moderators of the temperature for the exhaust  
60 gases, and favour the turbulence in their respective chambers.

According to the invention, the ferrite or graphite materials present geometrically a cylindrical symmetry along be their length, so that they can housed in lodgings made of metallic thin plates. In an alternative realization, said materials can also present the

form of a perforated disk applied to the escape pipe, with the purpose of allowing the passage of the gases and the oxidation reactions.

The advantages obtainable with the invention are not limited to the perfect depuration of the exhaust gases before they are released from the silencer; another advantage is a reduced level of noise, while the silencer presents reduced dimensions, which in any case improves the aesthetics of the vehicle. The  
75 silencer object of this invention can naturally be used for cars, trucks, buses, motor-cycles, tractors, excavators, road compressors, motorized cranes and the like.

In addition, the silencer object of this invention is very easy and economical to manufacture, and can be replaced by merely loosening the retaining band. Finally, it raises the overall efficiency of the engine.

We will now illustrate the object of the invention making reference to some preferred forms of realization shown in the adjoined drawings. The figures  
85 show:

fig. 1 – an axonometric view, partially in section, of the silencer in accordance with the invention;

fig. 2 – a cross section of the realization form, according to fig. 1;

fig. 3, 5 and 6 – other forms of realization with turbulence chambers of different types, figure 6 showing an eccentric disposition of said chamber;

fig. 4 – a longitudinal section of the silencer according to the invention, related to the variant of  
95 fig. 3;

fig. 7 – the schematic representation of a variant of the silencer according to the invention, having a parallelepipedal form;

fig. 8 – some geometric variants of the plates which favour the oxidation of the gases;

fig. 9 – an axonometric representation and an exploded view of a finned housing, holding ferrite or graphite elements;

fig. 10 – the top view of a perforated disk made of graphite or ferrite suited to be applied to the discharge exit;

fig. 11 – the top view of a silencer to be applied between the manifold of the gases and the exhaust  
110 pipe.

In the attached drawings, 3 indicates the jacket of the silencer, which is connected to the engine's discharge pipe by the bands 2. Inside the jacket 3 there are disposed in axial direction the perforated tubes  
115 4, through which the gases will penetrate into the turbulence chambers 5, provided with perforated walls. Inside the chambers 5 there are provided the points 6 bearing eventually graphite or ferrite cores, as well as thin plates bearing the points 7, which in fig. 8 are shown under preferred forms of realization. Between the turbulence chambers there are provided housings 8 to hold a metallic or catalytic sponge. Glass wool filters 10 are applied between the filters 9 and 11; this glass wool is also applied in the perforated outlet spaces 12.  
120

The different conformations of the turbulence chambers 5 correspond to as many forms of realization, while their efficiencies are alike.

Fig. 7 shows some variants of the named details.

The ferrite or graphite bars 14 can also be housed  
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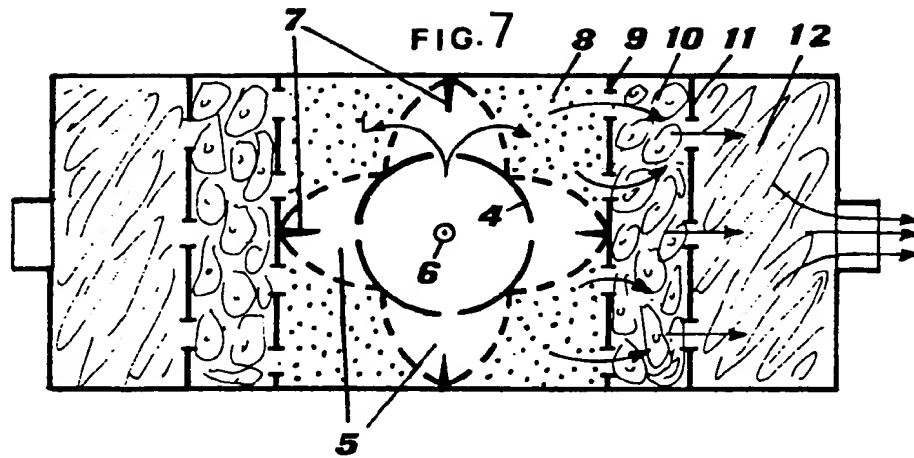


FIG. 8

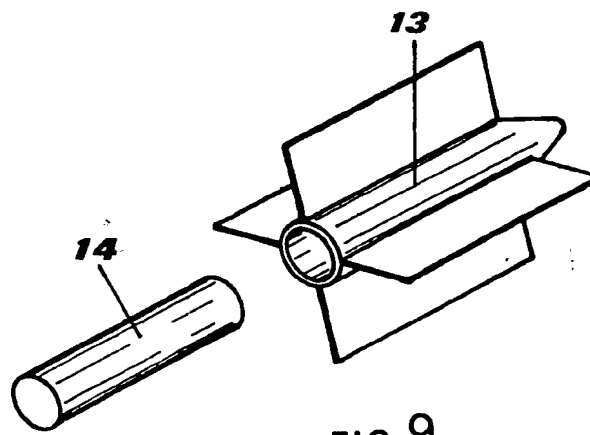
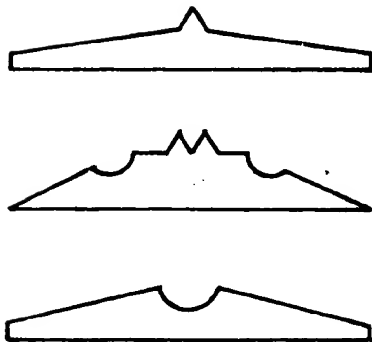


FIG. 10

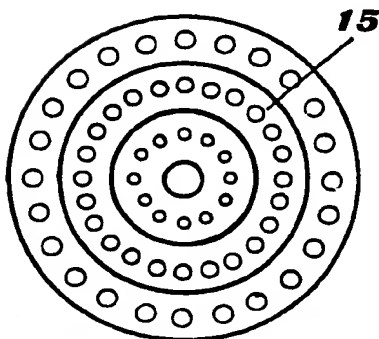
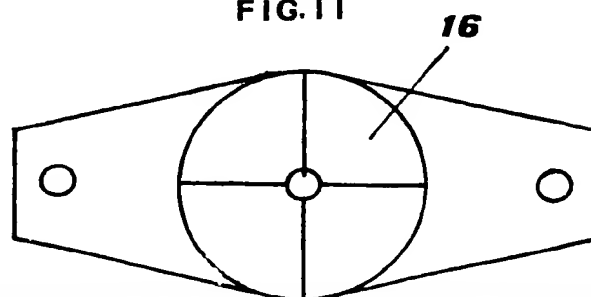


FIG. 11



in finned housings 13. These, in turn, can be fixed either on the escape pipe or, as a variant, between the manifold and the escape pipe through a band 16 (fig. 11). 15 indicates, besides, a graphite or ferrite disk having the same purpose of the named bars 14.

The working principle of the silencer is as follows:

the escape gases coming from pipe 1 penetrate through the perforations of pipe 4 into the turbulence chambers, which can have different conformations. Here they are oxidized by the platelets 7 and by the points 6, said points and platelets being provided or not with ferrite or graphite cores. Afterwards the gases are filtered through the metallic sponge 8, then through the glass wool 9, 10, 11 and 12, whence they exit, perfectly depurated, through the perforations 12, which are foreseen with an extended active surface.

The forms of realization exposed were presented only as examples; naturally variations as regards disposition, size and shape are possible, without thereby departing from the spirit of the invention.

#### CLAIMS

1. Anti-pollution silencer, suited to be connected to any internal combustion engine, apt to be applied to an existing silencer and respectively replace the same, with the purpose of obtaining a perfect depuration of the exhaust gases before these are released into the atmosphere, and to thoroughly oxidize the named escape gases without any need of chemical or artificial treatments, said silencer being essentially composed of:

a jacket of any shape, applied to the exhaust pipe with fixing bands;

filters made of metallic material, eventually catalytic glass wool and the like;

turbulence chambers housed into the jacket and containing eventually ferrite or graphite cores, which present thin plates provided with points or with thin metallic elements.

2. Anti-pollution silencer, as in Claim 1, characterised in that the thin platelets provided with points and respectively the thin metallic elements, under the bouncing action of the molecules of the unburned gas which are coming from the engine and are, besides, accelerated by the small dimensions of the turbulence chambers can be heated up to elevated temperatures, thus becoming sources of oxidation apt to obtain a perfect depuration of the carbonaceous substances contained in the escape gas.

3. Anti-pollution silencer as in Claim 1, characterised by the presence of ferrite or graphite elements in the form of bars, said bars being housed into finned housings made of thin steel sheet, and said housings being disposed inside the turbulence chambers and/or in the exhaust pipe, and serving to favour the turbulence and as moderators of the temperature.

4. Anti-pollution silencer as in Claim 1, characterised by perforated disks made of ferrite or graphite, placed at the outlet of the exhaust pipe.

5. Anti-pollution silencer as in Claim 2, characterised by the fact that between the manifold of the escape gases and the escape pipe are placed, with the help of bands, housing made of ferrite or

graphite.

6. Anti-pollution silencer as in the preceding claims, characterised in that the silencer has a parallelpipedal form.

7. Anti-pollution silencer as in the preceding claims, characterised in that, to the end of a fast disassembling and of a swift replacement, it is fixed to the exhaust pipe through a flange.

8. Anti-pollution silencer substantially as described herein with reference to and as illustrated in the accompanying drawings.

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